

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for indicating that claim 8 contains allowable subject matter.

Disposition of Claims

Claims 1-11 were pending in the present application. By way of this reply, claims 1, 3, 5, and 6 have been cancelled. Further, new claims 12-22 have been added to the application. Accordingly, claims 2, 4, and 7-22 are now pending in the present application. Claims 7, 8, 9, and 21 are independent. The remaining claims depend, directly or indirectly, from claims 7, 8, 9, and 21.

Claim Amendments

Claims 7-9 have been amended to be in independent form, including limitations similar to now-cancelled claims 1 and 5. Accordingly, claim 8 is now allowable. Additionally, claim 7 has been amended to clarify that a differential apparatus comprises two short pinion shafts respectively connected with the long pinion shaft at a right angle thereto, and claim 9 has been amended to clarify that each of the axial end surfaces of the short pinion shafts has a circular shape. Claim 2 has been amended to include limitations similar to now-cancelled claim 3. Claims 2, 4, 10, and 11 have been amended to depend from now independent claim 7. No new matter has been added by way of these amendments, as support for these amendments may be found, for example, in Figures 1C and 2A and in paragraphs [0025] and [0033] of the publication of the present application.

Objection(s)

Claim 4 is objected to because of an informality. By way of this reply, claim 4 has been amended to clarify, as suggested by the Examiner in the Office Action dated June 24, 2005, that “at least one of the pinion shafts is formed symmetrically to a rotational axis of the rotary member.” Accordingly, withdrawal of the objection is respectfully requested.

Rejection(s) under 35 U.S.C § 112

Claims 3 and 9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, claim 3 rejected for not being clear as to how many connecting walls are being claimed by “a second connecting wall.” By way of this reply, claim 3 has been cancelled. Thus, this rejection is now moot with respect to claim 3. Claim 2 has been amended to incorporate limitations similar to now cancelled claim 3. Accordingly, claim 2 now requires “a first connecting wall” and “a second connecting wall.” Claim 9 is rejected for not being clear as to whether a single or multiple short pinion shafts are being claimed. By way of this reply, claim 9 has been amended to be in independent form. Claim 9 has been amended to clarify that the pinion shafts comprise two short pinion shafts connected with the long pinion shaft. Accordingly, claim 9 is not unclear, and withdrawal of the rejection to claim 9 is respectfully requested.

Rejection(s) under 35 U.S.C § 102*Claims 1-7*

Claims 1-7 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,894,447 issued to Michael (hereinafter “Michael”). Claims 1, 3, 5, and 6 have been cancelled in this reply. Thus, this rejection is now moot with respect to claims 1, 3, 5, and 6.

Claim 7 has been amended in this reply to be in independent form and to clarify the present invention recited. Claims 2 and 4 have been amended to depend from claim 7. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The present invention is directed to a differential apparatus having radially arranged pinion shafts that support pinions. The pinions mesh with a pair of side gears, which they are between (*see, e.g.*, Publication, paragraph [0001]). As seen with respect to Figures 1A and 1B of the Specification, a projection 13 is formed on each short pinion shaft 4B. The long pinion shaft 4A has a hole 12, in which the projection 13 fits (*see e.g.*, Publication of Specification, paragraph [0024]).

Accordingly, amended independent claim 7 requires pinion shafts radially arranged on a rotary member, wherein the pinion shafts comprise a long pinion shaft and two short pinion shafts respectively connected with the long pinion shaft at right angles thereto. Further, claim 7 requires projections formed on respective axial ends of the short pinion shafts, wherein the projections are inserted in the hole so that the long pinion shaft and the short pinion shafts are connected to each other.

Michael, in contrast to the present invention, does not disclose long and short pinion shafts as required by the claimed invention. Further, Michael does not disclose projections as required by the claimed invention. Moreover, Michael fails to show or suggest these limitations. Michael is directed to a four-pinion differential having two pinion shafts disposed at ninety degrees to each other. Each shaft is continuous (*see* Michael, abstract). As seen with respect to Figure 5 of Michael, shaft 58 is designed to fit through hole 56 of shaft 54. Sleeve 66 fits over the section of reduced diameter 66 of shaft 58 (*see* Michael, col. 2, line 34 – col. 3, line 5). Michael clearly shows two pinion shafts that are equivalent lengths. Further, Michael is completely silent with respect to projections, as required by the claimed invention.

In view of the above, Michael fails to show or suggest the present invention as recited in amended independent claim 7. Thus, amended independent claim 7 is patentable over Michael. Dependent claims 2 and 4 are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1-6 and 9

Claims 1-6 and 9 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,974,717 issued to Breed *et al.* (hereinafter "Breed"). Claims 1, 3, 5, and 6 have been cancelled in this reply. Thus, this rejection is now moot with respect to claims 1, 3, 5, and 6. Claim 7 has been amended in this reply to be in independent form and to clarify the present invention recited. Claims 2 and 4 have been amended to depend from claim 7. As claim 7 was not rejected under 35 U.S.C. § 102(b) in view of Breed, dependent claims 2 and 4 are allowable for at least the same reasons. Claim 9 has been amended to be in independent form and to clarify that each of the axial end surfaces of the short pinion shafts has a circular shape. To the extent that the rejection may still apply to amended independent claim 9, the rejection is respectfully traversed.

As discussed above, the present invention is directed to a differential apparatus having radially arranged pinion shafts that support pinions. As seen with respect to Figure 2A of the Specification, short pinion shafts **4B** have arcuate grooves **16**, which fit between the shoulders **15** of the small diameter portion **14** of the long pinion shaft **4A**. The groove **16** formed at the end of each short pinion shaft **4B** contacts the peripheral surface of the small diameter portion **14** in a complimentary fashion (*see, e.g.*, publication of Specification, Fig. 2A, paragraphs [0033]-[0034]). Accordingly, amended independent claim 9 requires that each of the axial end surfaces of the short pinion shafts has a circular shape.

Breed, in contrast to the present invention, does not disclose that each of the axial end surface of the short pinion shafts has a circular shape, as required by the claimed invention. Moreover, Breed fails to show or suggest these limitations. Breed is directed to a four pinion differential with a differential lock to lock the differential for synchronous rotation of the side gears or differential rotation of the side gears (*see* Breed, abstract). As clearly seen with respect to Figure 2 of Breed, stub shafts **19, 20** have step portions formed at the axial ends of the stub shafts **19, 20**, which contact long shaft **22**. Further, Figure 3 of Breed merely shows ends of stub shafts **19, 20** having flat ends with no step portions. Clearly, rather than a circular shape, Breed merely discloses a stepped portion projecting from stub shafts **19, 20**.

Further, Breed states that the stub shafts **19, 20** are positioned in the recesses **72, 73** of the cross shaft **22**. Breed clearly states that the mating inner ends of the stub shafts **19, 20** are such that the cross shaft **22** and stub shafts **19, 20** are nonrotatably fastened in the housing **2**. Further, a locking bolt **29** and a nut **30** extends through the transverse opening **76** of the cross shaft **22**, and that tightening of the bolt **29** and nut **30** locks the stub shafts **19, 20** on the cross shaft **22** so that neither can move axially relative to each other. Breed is completely silent with respect to the axial end surface of each short pinion shafts having a circular shape.

In view of the above, Breed fails to show or suggest the present invention as recited in claims 2 and 4. Further, Breed fails to show or suggest the present invention as recited in amended independent claim 9. Thus, amended independent claim 9 is patentable over Michael. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C § 103*Claim 10*

Claim 10 is rejected under 35 U.S.C. § 103(a) as being obvious over Michael in view of U.S. Patent No. 6,027,422 issued to Yamazaki (hereinafter "Yamazaki"). Independent claim 7 has been amended in this reply to clarify the present invention recited. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

As discussed above, amended independent claim 7 requires long and short pinion shafts. Further, amended independent claim 7 requires projections formed on respective axial ends of the short pinion shafts, wherein the projections are inserted in the hole so that the long pinion shaft and the short pinion shafts are connected to each other.

As discussed above, Michael fails to show or suggest at least the limitations of amended independent claim 7. Further, Yamazaki fails to show or suggest at least the limitations of claim 7, from which claim 10 depends. Specifically, Yamazaki does not show or suggest projections formed on respective axial ends of the short pinion shafts, wherein the projections are inserted in the hole so that the long pinion shaft and the short pinion shafts are connected to each other. This is evidenced by the fact that Yamazaki is relied on by the Examiner in an attempt to render obvious limitations regarding an inner rotary member and an outer rotary member connected and disconnected by a clutch tooth. Yamazaki, in stark contrast to the present invention, merely discloses a single pinion shaft **22** that supports a plurality of pinion gears (*see* Yamazaki, col. 5, lines 37-44). It would be abundantly clear to one skilled in the art that Yamazaki does not show or suggest short and long pinion shafts, as required by the claimed invention. Further, Yamazaki fails to show or suggest projections formed on respective axial ends of the short pinion shafts.

In view of the above, Michael and Yamazaki, whether taken separately or in combination, fail to show or suggest the present invention as recited in claim 10. Thus, claim 10 is patentable over Michael and Yamazaki. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 11

Claim 11 is rejected under 35 U.S.C. § 103(a) as being obvious over Michael in view of U.S. Patent No. 5,273,499 issued to Friedl *et al.* (hereinafter "Friedl"). Independent claim 7 has been amended in this reply to clarify the present invention recited. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

As discussed above, amended independent claim 7 requires long and short pinion shafts. Further, amended independent claim 7 requires projections formed on respective axial ends of the short pinion shafts, wherein the projections are inserted in the hole so that the long pinion shaft and the short pinion shafts are connected to each other.

As discussed above, Michael fails to show or suggest at least the limitations of amended independent claim 7. Friedl fails to show or suggest at least the limitations of claim 7, from which claim 11 depends. Specifically, Friedl does not show or suggest projections formed on respective axial ends of the short pinion shafts, wherein the projections are inserted in the hole so that the long pinion shaft and the short pinion shafts are connected to each other. This is evidenced by the fact that Friedl is relied on by the Examiner in an attempt to render obvious limitations regarding a clutch tooth. Friedl, in stark contrast to the present invention, is directed to a clutch for a differential gear for a vehicle (*see* Friedl, abstract). Friedl is completely silent with respect to short or long pinion shafts. As Friedl does not show or suggest pinion shafts, Friedl necessarily cannot disclose projections formed on respective axial ends of the short pinion

shafts. Clearly, one skilled in the art would not form pinion shafts or projections on the pinion shaft based on the disclosure of Friedl.

In view of the above, Michael and Friedl, whether taken separately or in combination, fail to show or suggest the present invention as recited in claim 11. Thus, claim 11 is patentable over Michael and Friedl. Accordingly, withdrawal of this rejection is respectfully requested.

New Claims

Claims 12-19 have been added by way of this reply to depend from claims 8 and 9. As discussed above, claims 8 and 9 have been shown above to be allowable. Claims 12-19 contain limitations similar to limitations in amended claims 2, 4, 10, and 11 of the present application. Further, new independent claim 21 has been added by way of this reply, and claim 22 has been added to depend from claim 21. No new matter has been added by way of new claims 21 and 22, as support for these new claims may be found in, for example, paragraph [0025] of the publication of the Specification. Accordingly, entry and allowance of claims 12-22 is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 04995/136001).

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Respectfully submitted,

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